Lesson 2

Teach Mrs. Jones's Class about Microbes— (1 hour, 40-45 minutes, including student research time)

Section

Diseases

Investigative Questions

What are the agents of infectious disease? How can they be described?

Description of Content

There is one activity in this lesson. Students will research, prepare a lesson, and then teach their classmates more about microbes.

The content students will use is found on the Student Reproducible 2: *A Kid's Guide to Microbes.* Content is also available on the *BAM!* Web site at www.bam.gov/sub_diseases/diseases_immuneplatoon_microbes.html, www.sciencenetlinks.org/interactives/germs_resource.html, and www.microbe.org/microbes/what_is.asp. These sites are written for middle school students.

Relevant Standards

This activity fulfills science and health education standards.

Objectives

Students will:

- Describe what is meant by agent of infectious disease
- Research and compile information about microbes in general, and disease-causing microbes in particular
- Teach what they have learned to the class

Materials

- Student Reproducible 1: *Mrs. Jones's Outline*
- Student Reproducible 2: *A Kid's Guide to Microbes*

Safety

Normal classroom safety guidelines should be observed.

Teacher Background on Microbes

Microbes are organisms too small to be seen with the naked eye. There are microbes everywhere. Most microbes are beneficial. It is microbes that turn milk into cheese, make bread rise, and live in the stomach where they help digest food. There are four major categories of microbes: bacteria, viruses, fungi, and protozoa (a type of parasite).

Disease-causing microbes (most people call them "germs") can be from any of the four categories.

Disease microbes are spread in different ways. Many of the most common microbes, which cause diseases such as colds, flu, chickenpox, and other childhood illnesses, are airborne. They are spread by coughing and sneezing, or touching an object that the infected person has put in his mouth or sneezed on. Some microbial diseases are spread by contact with feces from an infected person. *E. coli* is an example. Some diseases are transmitted by an animal carrier. Deer ticks pick up Lyme disease from small animals such as mice (who don't even get sick from the disease), lay their eggs and travel around on deer, and sometimes end up on humans who can get sick if bitten. A number of skin diseases are caused by fungus. Children and teens often get fungal diseases in a gym locker room.

Procedure

Engagement (5 minutes)

1. Have a student read the definition of "agent" from the Lesson 1, Student Reproducible 2: *The Epidemiologic Triangle*, or remind students that agents are the germs (which scientists call microbes) that cause most infectious diseases. Each disease is caused by its own specific microbe. Tell students we are now going to do research on, and then teach about, the agents of infectious disease.

2. If you have not done Lesson 1, you might want to review with students that an infectious disease is usually caused by a microbe and spreads. Colds, flu, and childhood diseases such as chickenpox are a few examples. Ask students to name more. (If students mention things like a broken leg or cancer, explain these are not spread by microbes. You cannot "catch" them.)

Exploration (5 to 10 minutes for preparation, 40 minutes for student research)

1. Organize students in groups of three. Put the Web addresses students can use in their research on the board. Have Student Reproducible 1: *Mrs. Jones's Outline*, ready to pass out.

2. Explain to students: You are in Mrs. Jones's class. She will be out for the next few days. There is no substitute teacher available and she has left a note asking you to work together to teach her class.

   The class is studying infectious disease microbes and, unfortunately, she has lost the book. But she does have a fact sheet and several Web sites you can use for reference. She's also left an outline.

3. Tell students: First, do the research, using either the Student Reproducible 2: *A Kid's Guide to Microbes*, or online sources. Use the outline to collect and organize your data. Then plan how you will teach the class. Most important: don't be boring. Think of the cleverest ways you can to teach the content. (Hint:

Tell students it's OK to be funny—as long as the content is correct!) They are to teach the material so other kids will remember it. Encourage students to use drawings or props to teach the content.

4. Hand out Student Reproducible 1: *Mrs. Jones' Outline*, and let students prepare.

Explanation (40 minutes)

1. When students have completed their research and planned their lessons, ask the groups to present the lessons to the class.

Evaluation (10 minutes)

1. Ask students to briefly write answers to these questions:

   - Which presentations helped you learn and remember the content best?
   - Why do you think these presentations worked well?
   - What is the most important thing you have learned about microbes?

Performance Descriptors

Teach Mrs. Jones's Class			
Students in Group **1.** **2.** **3.** **4.**			
Category	**Scoring Criteria**	**Possible Points**	**Points Awarded**
Content (60 points)	Students clearly define microbe, adding an interesting fact or two.	20	
	Students clearly define four types of microbes: Bacteria Viruses Protozoa Fungi	20	
	Students tell how microbes are transmitted.	20	
Presentation (40 points)	Presentation is interesting and engaging. Students use a variety of techniques, including humor, to help their classmates remember the content.	40	
Total Points		**100**	

Text Correlations

Centre Point Learning, *Science II, Essential Interactions,* Unit 1: Cells, Tissues, Organs and Systems, "Cell Wars."
Glencoe, *Science Voyages,* Level Red, Chapter 15.3: Viruses
Glencoe, *Science Voyages,* Level Red, Chapter 17: Bacteria
Glencoe, *Science Voyages,* Level Red, Chapter 18: Protists and Fungi
Glencoe, *Teen Health, Level 1,* Chapter 12: Understanding Communicable Diseases
Glencoe, *Teen Health, Level 2,* Chapter 7: Preventing Diseases
Glencoe, *Teen Health, Level 3,* Chapter 17: Communicable Diseases

Web Resources

CDC *BAM! Body and Mind*™: www.cdc.gov/bam or www.bam.gov

> *BAM! Body and Mind* is brought to you by the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services (DHHS). *BAM!* was created to answer kids' questions on health issues and recommend ways to make their bodies and minds healthier, stronger, and safer. *BAM!* also serves as an aid to teachers, providing them with interactive

activities to support their health and science curriculums that are educational and fun.

Centers for Disease Control and Prevention (CDC): www.cdc.gov

The CDC Web site provides a comprehensive overview of the latest research on infectious diseases. From research studies on infectious diseases to information for travelers, this site provides a wealth of information. Some is written for medical professionals, but much of the information is written for health care consumers.

Microbe.org: www.microbe.org

A Web site created by the American Society for Microbiology and designed specifically for middle school students. It includes information, experiments, and a section called "microbes in the news."

Science NetLinks: www.sciencenetlinks.com

This site includes a wealth of lessons plans for science teachers at all grade levels. For the middle grades, there are lessons that specifically introduce students to microbes and to Louis Pasteur, a microbe discoverer.

Relevant Standards

National Science Education Standards

Content Standard C, Grades 5-8: Life Science
As a result of their activities in grades 5-8, all students should develop understanding of:

Structure and Function in Living Systems

- All organisms are composed of cells—the fundamental unit of life. Most organisms are single cells; other organisms, including humans, are multicellular.

- The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.

Regulation and Behavior

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

- Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.

Benchmarks for Science Literacy

By the end of the 8th grade, students should know that:

Chapter 6, Benchmark E, Grades 6-8: Physical Health

- Viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions. A person can catch a cold many times because there are many varieties of cold viruses that cause similar symptoms.

National Health Education Standards

Standard 1
Students will comprehend concepts related to health promotion and disease prevention.

- Explain the relationship between positive health behaviors and the prevention of injury, illness, disease and premature death.

- Analyze how environment and personal health are interrelated.

- Describe how lifestyle, pathogens, family history and other risk factors are related to the cause or prevention of disease and other health problems.

Lesson 2, Student Reproducible 1:

Mrs. Jones's Outline

This is the outline Mrs. Jones left for her substitute teacher. Use this outline to come up with a lesson plan so you can teach her class.

Web resources you can use:

- www.bam.gov/sub_diseases/diseases_immuneplatoon_microbes.html
- www.microbe.org/microbes/what_is.asp
- www.sciencenetlinks.org/interactives/germs_resource.html

I. What is a microbe?

A. Are they good or bad?
B. Add a fact or two about microbes here that you think kids will find interesting.

II. What are the four major kinds of infectious disease microbes? Tell a bit about each.

A. Virus
B. Bacteria
C. Fungus
D. Protozoa

III. How are infectious disease microbes transmitted (how do they move from one person to another, through mediums such as water, or sometimes from an animal to a person)? Explain and give some good examples.

A.
B.
C.
D.

Lesson 2, Student Reproducible 2:

A Kid's Guide to Microbes

Microbes (MY-krohbz) are the oldest form of life on earth. They are only a single cell—millions of them can fit into the eye of a needle! Many microbes are good—they help us eat and breathe. But some can invade animals and people. They can make you sick. The four kinds of microbes are:

Bacteria (back-TEER-ee-uh) are tiny, one-cell creatures that get nutrients from their environments in order to live. In some cases that environment is a human body. Bacteria can reproduce outside of the body or within the body as they cause infections. Some infections bacteria cause include sore throats, ear infections, cavities in your teeth, and even pneumonia (new-MO-nyuh).

But not all bacteria are bad. Some bacteria are good for our bodies—they help keep things in balance. Good bacteria live in our intestines and help us use the nutrients in the food we eat and make waste from what's left over. We couldn't make the most of a healthy meal without these important helper germs! Some bacteria are also used by scientists in labs to produce medicines and vaccines (vak-SEENS).

Viruses (VY-rus-iz) can't live outside of living cells. They need to be in or on a living thing like a plant, animal, or person in order to grow and reproduce. Whatever a virus lives in is called its host. When viruses get inside people's bodies, they can spread and make people sick. Viruses cause chickenpox, measles, flu, and many other diseases. There are vaccines against many viral diseases, too.

Protozoa (pro-toh-ZOH-uh) are one-cell organisms that love moisture and often spread diseases through water. They are parasites, which means they live off other organisms, in some cases humans. Some protozoa cause intestinal infections that lead to diarrhea (runny bowel movements), nausea, and stomach pain.

Fungi (FUN-guy) are organisms made up of many cells. There are many different types of fungi, and a variety of different sizes. They can range from individual cells to enormous chains of cells that can stretch for miles. Fungi may look like plants, but they cannot produce their own food from soil and water. Instead, they live off other animals and plants. Mushrooms and yeast are fungi. A common disease caused by fungus is athlete's foot.